

INDRO ROBOTICS “DRONES FOR GOOD” PROJECT

INDRO ROBOTICS TRAINING MANUAL INCLUDING BEYOND VISUAL LINE OF SIGHT

Prepared for

InDro Robotics Inc.
Salt Spring Island

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Prepared by: Original Signed by
R.D. Kobierski
Design Specialist

Reviewed by: Original Signed by
Philip Reece
Owner and CEO

Approved by: Original Signed by
Philip Reece
Owner and CEO



InDro Robotics Inc.
Unit 100, 334 Upper Ganges Road,
Salt Spring Island, BC, Canada
V8K 1R7

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PREAMBLE

This document has been prepared to support Unmanned Air Vehicle system operations at InDro Robotics Inc., located at Salt Spring Island, British Columbia, Canada. The following three major parts are included in this manual:

- a. training procedures;
- b. flight training exercises; and
- c. flight training lesson plans.

In addition to providing company flight training information for InDro students and instructors, this document, and the related InDro Operations Manual, and the System Flight and Maintenance Manual provided data require to support related Transport Canada Special Flight Operations Certificate applications.

MANUAL AMENDMENT PROCEDURES

Manual amendments will be promulgated as required by the Operations Manager. After acceptance and approval by Transport Canada (if necessary), they will be issued to each manual holder.

It is the responsibility of the manual holder to insert all amendments issued to him/her in a timely manner and ensure all manual pages are consistent with the List of Effective Pages. Manuals issued to each Unmanned Air Vehicle will be amended by the Operations Manager. Each amended page shall record the appropriate amendment number and date.

Any discrepancy between the List of Effective Pages and the actual manual pages will be brought to the attention of the Operations Manager immediately.

MANUAL HOLDERS

Manual Copy	Manual Holder	Address	Telephone
Master	Operations Manager	Unit 100, 334 Upper Ganges Road, Salt Spring Island, BC, Canada V8K 1R7	250-931-3933
Copy 1	Chief Pilot	Unit 100, 334 Upper Ganges Road, Salt Spring Island, BC, Canada V8K 1R7	250-931-3933
Copy 2			
Copy 3			

RECORD OF AMENDMENTS

NOTE

The portion of the text affected by the latest change is indicated by the standard Word designation of tracked changes, including vertical bars at the side of the page, strike throughs, underlined text and text colour changes.

The date of issue of original and amendment list pages are contained in the following table.

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Amendment 5			
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ABBREVIATIONS AND ACRONYMS

Abbreviations and acronyms have been inserted at the beginning of this document for ease of use. Acronyms are used throughout this InDro Training Manual and the reader is asked to refer to the list below for explanations of these acronyms.

3D	Three Dimensional
AGL	Above Ground Level
ADS-B	Automatic Dependent Surveillance–Broadcast
BVLOS	Beyond Visual Line of Sight
CARs	Canadian Aviation Regulations
CEO	Chief Executive Officer
CRM	Crew Resource Management
EMI	Electro-Magnetic Interference
EMS	Emergency Medical Services
FPV	First Person View
GPS	Global Positioning System
InDro	InDro Robotics Inc.
NOTAM	Notice to Airmen
PIC	Pilot-in-Command
RCMP	Royal Canadian Mounted Police
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Aircraft System
SFOC	Special Flight Operations Certificate
SI	Staff Instruction
SOP	Standard Operating Procedures
TC	Transport Canada
VO	Visual Observer
VLOS	Visual Line of Sight
VNC	VFR Navigational Chart
VTA	VFR Terminal Area Chart

1 INTRODUCTION

1.1 GENERAL

This Training Manual is the primary document used by Indro Robotics Inc. (InDro) to describe the InDro ground and flight training program conducted by the company. It has been prepared in accordance with the requirements of Staff Instruction 623-001, Review and Processing of an Application for a Special Flight Operations Certificate for the Operation of an Unmanned Air Vehicle (UAV) System, dated 19 November 2015 (Ref. A) pages 82 to 85 of 125, subparagraph (d) and (e).

These subparagraphs outline the requirements of this manual and the standard it must meet. Flight training exercises included herein are augmented by both Standard Operation Procedures (SOPs), and flows and checklists contained in the InDro Operations Manual (Ref. B).

1.2 BACKGROUND

InDro is continuing their development of Remotely Piloted Aircraft Systems (RPAS) for use in emergency response, disaster preparedness and planning, as part of this project and ongoing discussions with Transport Canada (TC), manuals and flight training programs have been formalised to ensure safe operations and progress InDro's operations, vehicles and crew to the level of TC "Compliant Operators".

1.3 AIM

The aim of this document is to provide the following information to InDro personnel: a description of the company training programs, a description of InDro's flight training exercises and InDro's flight training lesson plans.

1.4 SCOPE

InDro operations are detailed in the InDro Operations Manual. The compliant Remotely Piloted Aircraft (RPA) details may be found in the InDro Systems Flight Manual section of InDro library. Maintenance and servicing instructions for the RPA are located in the InDro System Flight and Maintenance Manual section of InDro library.

1.5 LIST OF REFERENCES

The following is a list of documents used within during the preparation of this Training Manual:

- A. Canadian Aviation Regulations. (new Part IX).
- B. Transport Canada Aeronautical Information Manual, TC AIM 2016-1, RPA-REMOTELY PILOTED AIRCRAFT, TP 14371E, effective 26 March 2020, Transport Canada.
- C. TP 15395 E (07/2019) Flight Reviewer's Guide for Pilots of Remotely Piloted Aircraft Systems 250 g up to and including 25 kg, Operating within Visual Line-of-Sight (VLOS)
- D. InDro Operations Manual, InDro Document OPS-019, 20 March 2020, Amendment 3 dated 17 July 2020.

- E. TP 13723 - Flight Test Guide - Private Pilot Licence – Aeroplane, <https://www.tc.gc.ca/eng/civilaviation/publications/tp13723-menu-2494.htm#g18> , Fourth Edition, April 2016.

Note: the Flight Test Guide was found to have a well structured flight test scoring system which is used herein.

1.6 TRAINING MANUAL OUTLINE

This document consists of the following parts:

Part 1 – Introduction. Part 1 provides background information for the document, outlines the aim and scope. This part also includes the list of references.

Part 2 – Training Procedures. Part 2 of this document includes all the information identified in the SFOC Staff Instruction (Ref. A) Annex D Para (3)(d) and (e) as it relates to the contents of a RPAS Training Manual.

Part 3 – Flight Training Exercises. Part 3 contains descriptions of all InDro flight exercises for normal operations and emergency operations.

Part 4 – Flight Training Lesson Plans. Part 4 contains the training structure organized into lesson plans, and the four-point making scale used to rate student performance.

Part 5 – Concluding Material. Training Manual concluding comments are contained in Part 5.

Editor's note: The InDro Standard Operating Procedures, Operations Manual, System Flight Manual and InDro Maintenance Manual have been published under a separate cover.

2 TRAINING PROCEDURES

2.1 GENERAL

This Training Manual has been prepared to be in accordance with the requirements of Staff Instruction 623-001, (Ref. A) pages 82 to 85.

This part includes the following information:

- a. an outline of the ground and flight training program;
- b. Company Indoctrination Training;
- c. Upgrading Training;
- d. Ground Technical Type Training (Initial and Recurrent);
- e. RPA Servicing and Ground Handling Training;
- f. RPAS Flight Training Program (Initial and Recurrent);
- g. Air Exercise Content Outline;
- h. Training and Qualification Records;
- i. Training Program Standards;
- j. Emergency Procedures Training For Pilots;
- k. Visual Observer Training; and
- l. RPAS Servicing and Ground Handling Training for Pilots.

2.2 TRAINING PROGRAM

- a. InDro has established and maintains a ground and flight training program that is designed to ensure that each person who receives training acquires the competence to perform their assigned duties.
- b. InDro's ground and flight training program will be conducted in accordance with this Training Manual and the training standards contained herein and includes:
 - (1) company indoctrination training;
 - (2) upgrading training;
 - (3) training in the specific work to be conducted; and
 - (4) initial and recurrent training, including:
 - (a) RPAS type training,
 - (b) procedures for passing piloting control from one control station or pilot to another,
 - (c) aircraft servicing and ground handling training,
 - (d) emergency procedures training,
 - (e) training for personnel who are assigned to perform duties associated with the flight, and
 - (f) any other training required to ensure a safe operation.
- c. InDro will:
 - (1) provide a pilot ground and flight training program as follows:

(a) Ground Training Program:

Section 1 Air Law and Procedures,
Section 2 Navigation and Radio Aids,
Section 3 Meteorology,
Section 4 Airframes, Engines and Systems,
Section 5 Theory of Flight,
Section 6 Flight Instruments,
Section 7 Flight Operations,
Section 8 Human Factors, and
Section 9 Radio Telephony;

(b) Flight Training Program:

Exercise 1. Familiarization,
Exercise 2. RPAS Familiarization and Preparation for Flight,
Exercise 3. Hand Controller,
Exercise 4. Take-off, Hover and Landing,
Exercise 5. Attitudes and Movements,
Exercise 6. Vertical Flight and Altitude Hold,
Exercise 7. Lateral and Longitudinal Flight,
Exercise 8. Translating Flight,
Exercise 9. Hovering Turns,
Exercise 10. Circular Flight about Pilot,
Exercise 11. Walking the Dog,
Exercise 12. Figure Eights,
Exercise 13. Approach and Landing,
Exercise 14. The Circuit,
Exercise 15. Low Flying,
Exercise 16. Precautionary and Forced Landings,
Exercise 17. Pilot Navigation,
Exercise 18. Night Flying,
Exercise 19. Multirotor Type Conversion,
Exercise 20. Emergency Procedures,
Exercise 21. Transit During BVLOS Operations,
Exercise 22. BVLOS Search, and
Exercise 23. Landing in an BVLOS Confined Area.

- (2) ensure that adequate facilities and qualified personnel are provided for its ground and flight training program.

2.3 TRAINING – STANDARD

2.3.1 Company Indoctrination Training

Company Indoctrination training is required upon employment for all persons assigned to an operational control function including the Operations Manager, Chief Pilot, Engineering Manager, Maintenance Manager and flight crew members. The Chief Pilot is responsible for the pilot training program. The Operations Manager is responsible for the training program for operational staff other than pilots. The program shall ensure that persons involved in control of flight operations are aware of their responsibilities, know company reporting relationships and are competent to fulfil their assigned duties related to flight operations.

General requirements for line indoctrination:

- a. crew members who have not qualified and served in the same capacity on the same group of RPAs shall complete the Initial Line Indoctrination;
- b. crew members who have qualified and served in the same capacity on the same group of RPAs shall complete Recurrent Line Indoctrination; and
- c. initial and recurrent line indoctrination shall be conducted under the supervision of the Chief Pilot.

This training is required for all persons assigned to the operation. The programmed time allotted for Company indoctrination training is four hours and includes, as applicable:

- a. Canadian Aviation Regulations and applicable standards;
- b. RPAS Special Flight Operations Certificate (SFOC) and the conditions specified therein;
- c. company reporting relationships and communication procedures, including duties and responsibilities of crew members and the relationship of their duties to other crew members;
- d. flight planning and operating procedures including
 - (1) operational preparation procedures related to reconnaissance of aerial work areas before low level flight operations; and
 - (2) operational restrictions;
- e. fuelling procedures, including fuel contamination precautions;
- f. critical surface contamination and safety awareness program;
- g. use and status of the operations manual including maintenance release procedures and accident/incident reporting procedures;
- h. meteorological training appropriate to the area of operation;
- i. navigation procedures appropriate to the area of operation;
- j. carriage of external loads;
- k. operational control system; and
- l. weight and balance system.

2.3.2 Upgrading Training

The programmed time allotted for Company Upgrading training to Pilot In Command (PIC) on a RPAS type is four hours and includes, as applicable:

Upgrading training to PIC on a RPA type shall include:

- a. completion of applicable qualification training related to assigned duties; and
- b. completion of type training as PIC on the RPA type and a PIC competency check.

2.3.3 Ground Technical Type Training (Initial and Recurrent)

Ground Technical Type Training (Initial and Recurrent) shall ensure that each crew member is knowledgeable with respect to the systems of the RPAS and all normal, malfunction and emergency procedures, as applicable to their assigned duties.

Programmed time allotted: initial: 5.5 hrs; and annual: 2.5 hrs.

Ground technical type training programs shall include:

- a. aircraft systems operation and limitations as contained in the RPAS operating manual, manual supplements, Standard Operating Procedures;
- b. use and operation of navigation and ancillary equipment;
- c. equipment differences of RPA of the same type, as applicable;
- d. RPA performance and limitations;
- e. weight and balance procedures; and
- f. RPA servicing and ground handling procedures.

2.3.4 RPA Servicing and Ground Handling Training

Training in RPA servicing and ground handling for each crew member, as applicable to their duties and applicable to the RPA type, shall include:

- a. fuelling/charging procedures as applicable:
 - (1) types of fuel, oil and fluids used in the RPA;
 - (2) correct fuelling procedures;
 - (3) procedures for checking fuel, oil and fluids and securing of caps; and
 - (4) procedures for charging batteries.
- b. use and installation of protective covers; and
- c. procedures for operating in cold weather such as:
 - (1) moving the RPA or other components of the RPA from a warm facility when precipitation or high humidity is present;
 - (2) RPA pre-heat procedures including proper use of related equipment; and
 - (3) managing battery degradation.

2.3.5 RPA Flight Training Program (Initial and Recurrent)

The initial and recurrent flight training program shall ensure that each crew member is trained to competently perform the assigned duties including those relating to abnormal and emergency duties. Simulated malfunctions and failures shall only take place under operating conditions which do not jeopardize safety of flight. The Flight Training Program is detailed in Part 3 and Part 4 of this Training Manual. In general, the InDro flight training programs include, as applicable to the RPAS:

- a. standard operating procedures for normal, abnormal and emergency operation of RPAS systems and components;
- b. use of check lists and pre-flight checks;
- c. crew member co-ordination procedures;
- d. normal take-offs/launches, circuits, approaches and landing/recovery including, as applicable, ground manoeuvring and hovering;
- e. control station fire procedures, including smoke control;
- f. fire control and handling of hazardous materials;
- g. simulated engine and system malfunctions and failures including hydraulic and electrical systems;
- h. simulated failure of navigation and communication equipment;
- i. stall (clean, take-off/launch and landing/recovery configuration) prevention and landing/recovery procedure;
- j. autorotations and anti-torque system malfunctions, as applicable;
- k. rejected take-off/launch and landing/recovery procedures;
- l. use of performance information and performance calculation procedures;
- m. simulated emergency descent;
- n. collision avoidance techniques;
- o. operational procedures involving visual observers;
- p. steep turns and flight characteristics;
- q. briefings on recovery from turbulence and windshear; and
- r. flight manoeuvres used in specific operations.

2.3.6 Air Exercise Content Outline

Each of the air exercises contained in Part 2 of this Training Manual is presented using the following annotated outline:

- a. **Objective.** The objective of this section is to detail what new knowledge or skill the student is expected to acquire.
- b. **Motivation.** This material explains why the student needs to learn particular skills. The instructor must ensure that the student knows why the lesson is important, and where it fits into the overall curriculum of studies.
- c. **Essential Background Knowledge.** This is the minimum knowledge required for the student to benefit fully from the air instruction. One of the obligations as an instructor is to make sure that students complete all the pertinent ground instruction before beginning air instruction.
- d. **Advice to Instructors.** The advice to instructors section provides information that may help the instructor in presenting or teaching a particular lesson.
- e. **Instruction and Student Practice.** This subsection includes the steps to follow in presenting the lesson. It also suggests exercises that will help the student to develop the skills needed to meet the objective.

2.3.7 Training and Qualification Records

The InDro Training Records summary form is contained in Annex A of this document. InDro will, for each person required to receive training, establish and maintain a record of:

- a. the person's name and, where applicable, personnel permit/licence number,
- b. if applicable, the person's medical category and the expiry date of that category;
- c. the dates on which the person, while in the RPA operator's employ, successfully completed any training or competency checks; and
- d. information relating to any failure of the person, while in the RPA operator's employ, to successfully complete any training or competency check or to obtain any qualification required herein.
- e. the type of RPAS or flight training equipment used for any required training, pilot proficiency check, competency check; and
- f. a copy of the most recent written examination competed by each pilot for each type of RPAS for which the pilot has qualification.

InDro will retain the records referred to in paragraphs (a) (3) and (4) above, for at least three years.

2.3.8 Training Program Standards

The syllabus of each training program shall include the programmed time allotted and the subject matter to be covered.

Manuals, if applicable, shall be provided during training to each trainee on the subject matter to be taught. Relevant training aids such as fire extinguishers, RPAS components, static RPA etc. shall be available for the programs presented.

Ground training programs shall provide a means of evaluating the trainee after completion of the syllabus by completion of an examination with a review and correction of any errors. Training examinations should be comprehensive, and periodically reviewed and updated.

2.3.9 Emergency Procedures Training For Pilots

Emergency Procedures Training for pilots is required on an annual basis and shall include instruction in the operation of all emergency equipment. Where practical training is required, it shall be completed on initial training and every three years thereafter.

- a. RPA fire in the air and on the ground;
- b. use of fire extinguishers including practical training;
- c. operation and use of emergency landing including practical training;
- d. spectator preparation for an emergency landing including practical training;
- e. pilot incapacitation including practical training;
- f. control hijacking, interference and other security procedures;
- g. special emergency procedures when the aircraft is used on Emergency Medical Services (EMS) operations including emergency situations.

Programmed time allotted: Initial and every three years: two hours; annual: one hour.

2.3.10 Visual Observer Training

An approved initial and annual recurrent training program is required for company personnel responsible for Visual Observer duties as part of a RPAS flight crew. The training program shall consist of:

- a. duties and responsibilities;
- b. communication procedures;
- c. applicable regulations and standards;
- d. flight preparation procedures as applicable to assigned duties;
- e. procedures in the event of an emergency or overdue RPA;
- f. accident and incident reporting procedures; and
- g. requirements of approved company Operations Manual as applicable to the duties and responsibilities.

Visual observer training shall be conducted at the same time as pilot flight training. The procedures taught will include those of the Sterile Cockpit and the communications protocol that requires all inter-crew communications to be clear, meaningful, topical and brief. Prowords and expressions such as clear ahead, three o'clock, aircraft approaching from our seven o'clock shall be employed. The pre take-off checklist will be conducted as a challenge and reply communication.

2.3.10.1 Visual Observer Conning

There may be situations when the Visual Observer (VO) is in a better position to judge the clearance available between the RPA and obstructions, and as such may be asked by the pilot to provide verbal conning instructions. These will be initiated with the words "VO this is the pilot, you have the conn", to which the VO states: "Pilot this is the VO, I have the conn". The reverse terminology is used when control is passed back to the pilot: "Pilot this is the VO, you have control", and "VO this is the pilot, I have control". With the conn, the VO uses the prowords: ahead 'number', left 'number', back 'number', right 'number', turn left 'number', turn right 'number', up

'number', down 'number'; where in the number is either meters or degrees. Other expressions used are: "stop, stop, stop", "hover", "clear" and "continue". Conning instructions will be thought through prior to transmission and will be delivered in a confident voice.

2.3.10.2 Visual Observer BVLOS Communications

During Beyond Visual Line of Sight (BVLOS) operations the PIC shall announce to the VO when the aircraft is no-longer within Visual Line of Sight (VLOS), the VO will either indicate that the aircraft is still within the VO's VLOS or is also beyond VLOS. If the aircraft is still within VLOS and VO will subsequently tell the pilot when the aircraft has flown beyond VLOS. At this time the VO will advise that the area around the aircraft is being searched for manned air vehicles. Binoculars may be used. Once the RPA has flown so far that the area around the vehicle cannot be reasonably monitored the VO will so advise the pilot.

When the RPA is being flown from BVLOS to within VLOS the pilot will advise the VO of the relative bearing that the air vehicle will first appear. Normally this will be twelve o'clock as the crew should be facing the approaching RPA. The pilot will provide sufficient notice so that the VO can start searching the airspace around the approaching RPS even before the RPA is within LOS. Binoculars may be used. Once the VO gains visual contact with the unmanned aircraft the VO will tell the pilot and verbally guide the pilot's eyes onto the RPA, if necessary.

Programmed time allotted: four hours

2.3.11 RPA Servicing and Ground Handling Training for Pilots

Servicing and ground handling training for pilots will cover the following topics:

- a. battery charging procedures:
 - (1) types of batteries used,
 - (2) correct charging procedures, and
 - (3) procedures for checking batteries, and proper securing.
- b. procedures for operating in cold and wet weather; and
- c. securing and transport of RPA batteries whilst stored.

Programmed time allotted: one hour.

3 FLIGHT TRAINING EXERCISES

3.1 EXERCISE 1. FAMILIARIZATION

Objective

The objective of this exercise is to expose the student to the capabilities of a multirotor RPA, increase the level of enthusiasm for the activity and provide an opportunity for the student to ask questions regarding the flight-training program.

Motivation

RPAS can be used for a multitude of applications and this exercise will bring to light many of these roles.

Essential Background Knowledge

There is no essential knowledge required for this familiarization exercise.

Advice to Instructors

Make this an interesting and enjoyable lesson and at the same time explain that the use of a RPAS is serious business that requires dedication to achieve the skills and knowledge required for a Compliant Operator status. Conduct a demonstration flight based on the interests of the student, for example if the student is aware of Search and Rescue activities, demo a portion of a search pattern. Ensure that each aspect of the mission is conducted including all flows, briefings and checks.

Instruction and Student Practice

Briefly review the pre-flight activities required to get the RPA airborne and explain that more time will be spend later teaching these important aspects of the flight. Once at the take-off location discuss safety and the associated responsibilities of the flight crew. The instructor should fly the RPA in a controlled and responsible manner, at all times staying within the requirements of the SFOC and Operations Manual. At the same time the capabilities of the RPA and RPAS in general should be demonstrated. Depending on the flight control arrangement (buddy box), allow the student to fly the RPA in a safe and nonthreatening environment.

3.2 EXERCISE 2. RPA FAMILIARIZATION AND PREPARATION FOR FLIGHT

Objective

The objectives of this exercise are for the student to learn:

- a. the location and functionality of the components of the RPAS training system;
- b. the capabilities and operational limits of the RPAS training system; and
- c. the flows and checks require prior to flight.

Motivation

Knowledge of the functionality of the RPAS training system components will speed the flight training learning process.

Essential Background Knowledge

It would be advantageous for the student to have attended the ground school lesson Section 4 Airframes, Engines and Systems prior to this flight exercise.

Advice to Instructors

The familiarization flight will have introduced the student to the sensation of RPA flight, during this lesson the functionality of the components should be related back to this flight. If possible, have a RPAS available that the student can touch and explore during the lesson. Remove the rotor blades prior to powering up the system.

Instruction and Student Practice

Begin this exercise at a bench where the student can inspect the RPAS, the individual components of the RPAS and the other items required for flight such as the hand controller, radios, anemometer, checklists, etc. With a system architecture present point out each of the elements of the RPAS. Explain in detail battery maintenance and safe employment of the batteries. Stress the hazards associated with RPA batteries. Teach the student how to conduct a pre-flight inspection of the RPAS and how to conduct the Pack Up Flow. Teach the student all the other activities that are required prior to flight as itemized in the InDro flows and checks.

3.3 EXERCISE 3. HAND CONTROLLER

Objective

The objective of this exercise is to teach the student how to hold and operate the RPAS hand controller.

Motivation

Once use of the hand controller becomes second nature, the flying of the RPA will develop into an intuitive easy to perform activity.

Essential Background Knowledge

Knowledge require prior to undertaking this exercise includes:

- a. aerodynamics and kinematics of multirotor control;
- b. modes of the flight controller; and
- c. the RPAS system architecture and the function of the hand controller.

Advice to Instructors

This exercise should be kept at a need to know level of understanding, that is to say, making the discussion of the hand controller functionality overly complicated will be less helpful. Instruction regarding Global Positioning System (GPS) mode switches and other unused functions should be brief.

Instruction and Student Practice

The instruction should start in the classroom with images of the basic quadrotor control system. The concept of flight modes should be fully reviewed and understood prior to introducing the concept of RPAS control through the control stick. Each of the hand controller switches, leavers and menu items should be discussed so that the student is aware of the function (or lack thereof) of each switch. The instructor should use a RPA without rotor blades installed to demonstrate rotor speed changes with flight controller inputs and vehicle attitude changes in stabilize mode.

3.4 EXERCISE 4. TAKE-OFF, HOVER AND LANDING

Objective

The objectives of this exercise are for the student to become skillful at:

- a. taking off and climbing vertically to a normal hover height of 3 ft;
- b. conducting a vertical descent from a hover to a zero rate of descent landing; and
- c. maintain a hover over a landing position (max 2 ft deviation).

Motivation

Many accidents occur during take-off and landing so skillful operation in these phases of flight is essential. Every flight requires at least one take-off and one landing.

Essential Background Knowledge

Knowledge require prior to undertaking this exercise includes:

- a. functionality of the hand controller; and
- b. an understanding of collective thrust of the rotor system.

Advice to Instructors

This exercise is taught during the first instructional flight following the familiarization flight. Prior to the training exercise, the instructor should trim the system to ensure a stable hover. The instructor should then commence by demonstrating the exercise with an instructional patter, and then encourage the student to conduct the same exercise.

To start, position the student directly behind the RPA approximately 10 ft from the RPA and, with the system unarmed, hold the RPA at the hover position to establish the sight picture for the exercise.

Instruction and Student Practice

This manoeuvre should start with a demo and practice of a take-off followed immediately by a landing; after these can be accomplished effectively then the instructor should demo, and the student should practice, stopping in a hover for progressively longer periods of time prior to the landing.

3.5 EXERCISE 5. ATTITUDES AND MOVEMENTS

Objective

The objectives of this hovering exercise are to teach the relationship between longitudinal stick position, pitch attitude and longitudinal movement; and lateral stick position, bank attitude and lateral movement.

Motivation

Practiced control of the RPA attitude is essential for all manual flight.

Essential Background Knowledge

Knowledge require prior to undertaking this exercise includes:

- a. an understanding of the various modes of the flight controller;
- b. an understanding of the controller trim system; and
- c. an understanding of stick position and RPA attitude control for each flight controller mode.

Advice to Instructors

This exercise can follow from the hovering training of Exercise 4. The distance the RPA is moved should be limited to approximately 3 ft in any direction so that the student does not have to include large power changes to maintain hover height. This exercise should be conducted with the flight mode that is easiest for the student to use, for example stabilize mode. The instructor should ensure that the controller is trimmed. The instructor should teach how the other flight modes are selected and provide a demonstration of flight in these modes.

Instruction and Student Practice

The instructor should establish a steady hover and then demonstrate lateral attitude changes and the resultant direction of translational movement of the RPA. The instructor should then demonstrate the same for longitudinal motion and then the RPA should be landed. The student should repeat the same exercise until the RPA can be manoeuvred and then returned to a steady hover over the landing position.

3.6 EXERCISE 6. VERTICAL FLIGHT AND HEIGHT HOLD

Objective

The objectives of this hovering exercise are to teach the relationship between thrust control and vertical movement of the vehicle.

Motivation

Practiced control of the RPA height above ground level is essential for all manual flight.

Essential Background Knowledge

The student should have an understanding of rotary wing flight in ground effect and out of ground effect.

Advice to Instructors

The instructor should encourage the student to manipulate the thrust control as required to learn the sensitivity of the control and the control input required to arrest vertical motion in either direction. Momentum of the vehicle, especially in the downwards direction should be briefed. As with other early exercises the student should be positioned directly downwind of the RPA with the RPA pointing directly away from the student.

Instruction and Student Practice

The instructor should start this exercise from a steady hover and describe the control movements required to fly the RPA vertically from a 3 ft hover upwards and then downwards, re-establishing a steady 3 ft hover. The instructor should then demonstrate maintenance of a steady hover at a height of 10 ft and perhaps 30 ft, discussing the different visual cues at these new hover positions. Student practice should follow.

3.7 EXERCISE 7. LATERAL AND LONGITUDINAL FLIGHT

Objective

The objective of this exercise is for the student to learn the mechanics of longitudinal flight and lateral flight (max 2 ft deviation from the initial hover height).

Motivation

Every operational flight will require transiting to a new location in order to conduct a mission. Early appreciation of the visual indications of RPA response to longitudinal and lateral control inputs, even when viewed from the side, is fundamental to good RPA control.

Essential Background Knowledge

The knowledge require prior to undertaking this exercise includes:

- a. an understanding of the RPA power requirements for flight as the RPA moves from a hover; and
- b. an understanding of control stick position and RPA motion as the RPA is viewed from various oblique directions.

Advice to Instructors

At this early stage of training, the instructor should encourage the student to orient flight relative to the established direction of the wind, pointing the RPA into-wind for the take-off and initial hover, and eventual landing. The student should stand immediately downwind. Caution the student to, when flying rearwards, fly slowly so that the RPA does not overshoot the desired hover location and become a hazard to the pilot. The student should be encouraged to keep the RPA pointing into-wind (or pointed in the directions chosen to signify the into-wind direction) as it is moved laterally from the original take-off location. Lateral flight with the RPA pointed in the direction of movement will be undertaken in a subsequent exercise.

Instruction and Student Practice

The instructor should start by demonstrating straight flight from a hover, to approximately 30 ft (10 m) upwind, heading into-wind, followed by a change in motion to rearwards flight along the same path back to the original hover position. At this time there is no requirement to establish a hover prior to reversing the direction of motion. The speed used should be that of a fast walking pace although flight at speeds selected by the student should also be encouraged. After student practice, lateral flight to approximately 15 ft (5 m) on either side of the hover position should be demonstrated and practiced. The original air vehicle heading should be maintained throughout this exercise.

3.8 EXERCISE 8. TRANSLATING FLIGHT

Objective

The objective of this exercise is for the student to become skillful at flying the RPA from a hover at the take-off location to a location nearby and establishing a hover at the new location (max 3 ft lateral deviation at the new position).

Motivation

Translating from one location to another, and being able to maintain a hover at the new location are essential skills for many RPAS operational tasks.

Essential Background Knowledge

Knowledge required prior to undertaking this exercise includes:

- a. an understanding of the visual cues associated with maintaining a hover at a distant location; and
- b. an understanding of the limitation of visual line of sight and electronic line of sight.

Advice to Instructors

Give this exercise the time it needs as the probability of an accident will increase if the student loses SA while establishing a distant hover. Some pilots find it easier to orientate the RPA to point directly away from them when the hover position is at an oblique angle to the wind. This should be discouraged until the upcoming exercises on turning flight have been completed. In this exercise the instructor may include walking about so that the RPA can fly at greater distances than would be the case if the pilot remains stationary.

Instruction and Student Practice

The instructor should demonstrate flight from a hover to a new hover position approximately 30 ft upwind. A steady hover should be established prior to rearwards flight back to the original hover location. After student practice, the same exercise should be conducted with lateral flight to a hover approximately 15 ft to the left of the original hover position and again approximately 15 ft to the right. Once this portion of the exercise has been mastered, the instructor should demonstrate and the student should practice straight flight to random hover locations nearby, maintaining the heading into-wind at all times.

3.9 EXERCISE 9. HOVERING TURNS

Objective

The objective of this exercise is to teach the student to conduct brief hovering turns (max 90 deg) over a fixed spot (max 3 ft lateral deviation at the hover position).

Motivation

Often the RPA will be required to turn to a new heading while established in a hover, for example if conducting a photo shoot with a two axis gimbal or to depart in a direction that is not into-wind.

Essential Background Knowledge

The student should have an understanding of:

- a. how the yaw control of the RPA functions and how the pilot controls the RPA heading;
- b. how the wind will affect the hover position of the RPA if control compensation is not applied; and
- c. the concept of control reversal when the RPA is flown towards the pilot.

Advice to Instructors

This will be the first time that the student will have oriented the RPA so that it points other than directly into-wind. Keep the exercise limited to plus and minus 90 deg of the into-wind direction and have the student stand directly downwind of the hover location.

The student will not have been exposed to the reversed control phenomena associated the flight pointed or heading directly back at the pilot. This exercise will require the student to partially reach this case with the RPA pointing to the left and the right. This concept of control reversal should be well briefed prior to this exercise and perhaps shown by the instructor.

Instruction and Student Practice

Demonstrate hovering turns to the left and right of the into-wind hovering direction to assess the sensitivity of the yaw control. Follow this with turns and stabilized hovering flight at headings other than into-wind. Start with approximately 45 deg and then work up to hovering flight with a heading at 90 deg to the original hover heading.

3.10 EXERCISE 10. CIRCULAR FLIGHT ABOUT PILOT

Objective

At the completion of this exercise the student should be able to manipulate the thrust and yaw controls while at the same time exercising the pitch and bank controls to maintain a circular flight path (max 5 ft range deviation from circular path).

Motivation

This exercise builds up the skills required to conduct coordinated (banked) turns in forward flight.

Essential Background Knowledge

During this exercise the instructor and the student will have to move about to maintain a safe distance from the RPA. Awareness of the safe manoeuvring distance for crewmembers is essential.

Advice to Instructors

If rotating the RPA in a counter-clockwise direction, ask the student to stand on your right side and vice-versa for clockwise turns. Explain how the control inputs are used to compensate for wind as the turn progresses to keep a constant radius for the turn and a constant speed. The intention is to establish turning flight with a small but constant yaw rate. Once the student becomes proficient, consider walking and turning at the same time.

Instruction and Student Practice

From a steady hover into-wind at a distance of approximately 10 to 20 ft (4 to 7 m), demonstrate a 360 deg turn about the spot at which the pilot is standing. Demonstrate a similar turn in the opposite direction. Land the RPA and exchange controls with the student who would repeat the same exercise. As experience is gained, use a shorter radius to the circle and a faster rate of rotation. The final speed of the RPA should be that of a fast walking pace.

3.11 EXERCISE 11. WALKING THE DOG

Objective

At the completion of this exercise the student should be able to fly the RPA in all simple manoeuvres associated with “air taxi”. The majority of the manoeuvres will be conducted with the RPA pointed away from the student leading up to flight with the RPA pointing in many different directions relative to the direction that the student is facing (max 2 ft deviation from the initial hover height, continuous movement in the intended direction).

Motivation

This exercise builds up the skills required to fly the RPA during flight manoeuvres that are both transverse in direction of view and in reverse, that is pointed directly at the pilot.

Essential Background Knowledge

This exercise is the first time that the student must relate rotation of the aircraft x and y axis to the flight controller positioned directly in front of the pilot who holds it pointed away from his or her body. Prior to starting this exercise, it is essential that the student review the concept of reversed controls as the RPA flies towards the pilot.

Advice to Instructors

Start this exercise, after a demo, with the student flying the RPA while walking about behind the aircraft. The height should be kept at a steady three-foot hover height. Ask that the student to walk forewords keeping the front of the RPA pointed in the direction of movement. Address the difficulties that are encounters by flying this exercise in the wind. Progress the instruction by asking the student to manoeuvre the RPA without necessarily standing behind it in the Walk the Dog location. The intent is to encourage the student to be able to naturally and with confidence fly turns and steady hovering with the RPA pointed in any direction relative to the location and direction that the pilot is standing. This particular portion of the exercise is fundamental to continued learning. Before progressing to the next exercise ensure that the student can conduct a coordinated banked turn to roll out on a specific heading.

Instruction and Student Practice

From a steady hover into-wind at a distance of approximately three ft, demonstrate flying the RPA as if the RPA were on a leash and was pulling the instructor around the flying area. Keep the RPA pointed in the direction of movement while walking behind it. Hand over the controller and allow the student freedom to walk the dog about the area in accordance with the student’s skill level. At times require that the student follow a course set out around cones positioned in the flying area. Demonstrate flying the RPA towards the pilot and also conducting pirouettes in front of the pilot. Allow the student to experiment with RPA control on various headings allowing student’s confidence to build.

3.12 EXERCISE 12. FIGURE OF EIGHTS

Objective

The objective of this exercise is to teach to student to fly coordinated (banked) turns (max 2 ft deviation from the initial hover height, continuous movement in the intended direction).

Motivation

During forward flight a pilot will be required to turn the RPA and the most efficient method is to use coordinated or banked turns. If the RPA is equipped with a forward looking camera, then coordinated turns are the only way to keep the camera facing along the flight path.

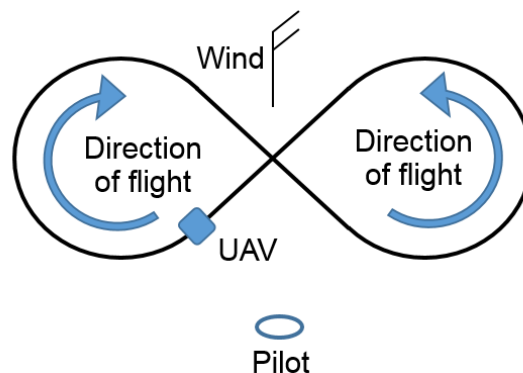
Essential Background Knowledge

The student should be aware of:

- a. the definition of a coordinated turn;
- b. the control input required to maintain a coordinated turn; and
- c. the concept of control reversal when the RPA is flown towards the pilot.

Advice to Instructors

During this exercise the student may experience the condition of flight wherein the RPA flies directly at the pilot. The instructor should be prepared to react to control confusion by the student. The intent is to become skilled at rolling into and out of a banked turn on a specific track. The orientation and direction of flight of the figure of eight pattern is key to a successful exercise. Consideration should be given to placing a cone at the center of each turn in the pattern to assist with orientation. Orienting the axis of the figure of eight at 90 deg to that shown in the figure may also be tried, although safety must be addressed when the RPA is approaching the pilot.



Instruction and Student Practice

The instructor should demonstrate flight in the figure of eight path at a nominal height above the surface. As the pattern is flown the instructor should describe the control inputs required, the visual cues used and the compensations made for the effects of wind. The instructor should also demonstrate how a recovery from uncoordinated flight should be accomplished, at a random location in the pattern, by establishing a hover into-wind followed by a transit back to the home hover position. The RPA would then be turned to point along one leg of the pattern and the flight would be commenced again. The student should practice until proficient.

3.13 EXERCISE 13. APPROACH AND LANDING

Objective

The objective of this exercise is to teach the student how to conduct an into-wind approach to a hover location (continuous rate of descent and continuous movement in the intended direction).

Motivation

Safe and efficient approaches to a hover and the subsequent landing are important to RPA operations, both from flight perspective and from the perspective of ground operations to avoid an accident.

Essential Background Knowledge

In order to complete this exercise, the concept of a constant angle decelerating approach should be understood by the student. This usually requires a briefing using a white board.

Advice to Instructors

The instructor should teach this exercise as part of the next exercise, that being the circuit. The most difficult part of this manoeuvre is maintaining a constant rate of descent as the airspeed is reduced. With practice a confident deceleration on short final will allow positive constant angle approaches to be conducted.

In order to save time the instructor may conduct the take-off and fly to a position that is suitable to commence the approach. Later on, during the exercise associated with the circuit this approach and landing exercise can be integrated into the circuit training.

Instruction and Student Practice

Following a pre-landing check and once at the centre of the base leg of the circuit the instructor should start this exercise by commencing a slow descent. Deceleration would be conducted once the RPA has turned onto final approach. The transition to a hover (approach and landing) should be demonstrated and then practiced by the student.

3.14 EXERCISE 14. THE CIRCUIT

Objective

The objective of this exercise is to teach the student how to fly a pattern that involves flight at a distance greater than 20 ft.

Motivation

Flight of a RPA can be conducted to a range of approximately 750 meters or as limited by Line of Sight as defined by TC. This exercise allows the pilot to fly away from the immediate hovering locations.

Essential Background Knowledge

The student should be aware of:

- the definition of Line of Sight;
- the definition of the parts of a flight circuit (Ref. A, From the Ground Up, Unmanned);
- the importance of monitoring of the direction that the RPA is pointed; and
- the importance of monitoring the life of the battery (time since charge).

Advice to Instructors

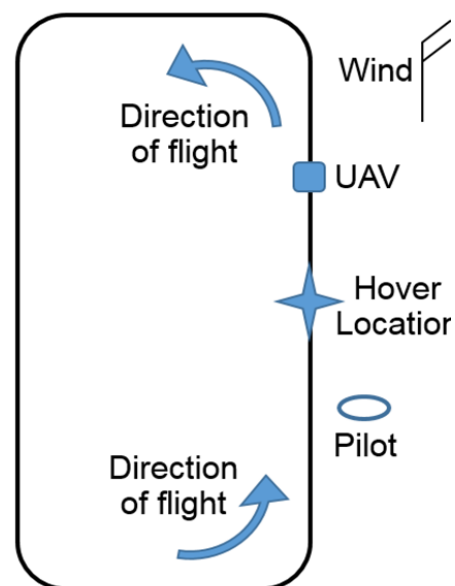
Thoroughly brief this exercise on a white board to ensure a complete understanding by the student of what is required.

Start this exercise with a fly past rather than an approach to a hover, at the end of the circuit, to make the pattern easier for the student to fly. It is suggested that the previous exercise “Approach and Landing” eventually be practiced at the same time that the circuit is taught. The exercise takes sufficient time to fly that the instructor can comment during the flight exercise, for example: “that is a good height for the downwind leg”.

Instruction and Student Practice

Once the orientation of the circuit has been decided, visual landmarks should be identified to assist with the initial circuit practice. The instructor should demonstrate the circuit discussing the affect of wind on the pattern and then allow the student to practice. To assist with orientation, the instructor and the student should position themselves downwind of the landing position and to the right of the approach path. Take-off and Landing checks should be employed as required.

Turns conducted in the circuit should be coordinated turns with speed maintained during the turn.



3.15 EXERCISE 15. LOW FLYING

Objective

The objective of this exercise is to teach the student how to safely fly the RPA at a low height.

Motivation

There are times when flight at a low height is required, for example searching under a tree line for lost persons, or maintaining the 100 ft Above Ground Level limit in a built-up area. These manoeuvres must be conducted safely, which requires training and practice.

Essential Background Knowledge

In order to conduct low flight safely the student should be aware of the hazards associated with nap of the earth flight and contour flight. The requirement for power addition during departures from the hover and during turns should be reviewed. This is one time that the old WW II saying “don’t take power off in turns” really applies.

Advice to Instructors

Chose the speed of the manoeuvre to match the safely requirements. For example, a Search and Rescue search can be conducted slowly, however very slow flight will not allow much area to be searched. To great a speed may result in the object of the search to be over-flown without detection. The advantages of a contour search over a grid search should be considered when choosing the route to be flown. Note that is may be advantageous for the pilot to move during this exercise. This will make the exercise more interesting as new viewing angles will be encountered.

This is an opportunity to discuss airmanship and a mature approach to flying. Low flight can be thrilling but if that this the only reason for fly low then perhaps the flight profile should be reassessed.

Instruction and Student Practice

After determining the route for the low flight, select a viewing location that will permit adequate assessment of the height above ground during the whole mission. Demonstrate flight at a low height discussing the visual cues used to judge height and then have the student repeat the same exercise.

3.16 EXERCISE 16. PRECAUTIONARY AND FORCES LANDINGS

Objective

The objective of this exercise is to teach the student how to land the RPA at a location that is not the intended point of landing.

Motivation

There are times when the mission does not proceed as expected and the pilot must land the aircraft promptly. In these cases, it is important to make this unforeseen landing be conducted as safely as possible.

Essential Background Knowledge

The student should be aware of:

- a. the meaning of:
 - (1) land as soon as practicable,
 - (2) land as soon as possible, and
 - (3) land immediately;
- b. pilot-Visual Observer (VO) conning procedures; and
- c. an understanding of the limitation of visual line of sight and electronic line of sight.

Advice to Instructors

Commence this exercise by flying the RPA to the extent of the Visual Line of Sight (VLOS) over a predetermined safe landing area such as an empty sports field. After discussing the need to land immediately conduct an approach and descent to a hover at a low altitude. Do not attempt a landing but discuss the difficulties associated with a landing. Consider conduct of an out of wind landing with the RPA pointed directly away from the pilot so that it is easy the reduction of lateral drift.

In some situations, the VO will have a better view of the RPA during a precautionary or forced landing. The procedures to be used for the conning of the RPA under this situation should be discussed in advanced, with the VO providing directions for a hover (not a landing) at a distance. A landing under the verbal direction of the VO should be considered with the RPA over the nominal (home) landing area.

Instruction and Student Practice

With the RPA at increasing distances from the pilot, the instructor should demonstrate an emergency approached to a hover (or low altitude flight as limited by safe flight conditions) and then the student should conduct supervised practice of the same precautionary or forced landing procedure. In addition, the instructor should demonstrate use of the crew radio to conduct a precautionary approach using the conning direction of the VO. An actual landing using conning instructions should be conducted at the home landing position if considered safe.

3.17 EXERCISE 17. PILOT NAVIGATION

Objective

The objective of this exercise is to teach the student how to navigate within the VLOS distance using the basic air vehicle without a pilot camera. Navigation with a camera will be introduced in the RPA type conversion exercise.

Motivation

Prior to any sortie the pilot will have conducted a map study as part of the site survey. This exercise will allow the student to apply basic navigation techniques to allow accurate flight around the operating area. The operating area can be quite large if the pilot and VO are equipped to move along trails and open fields during the progress of the mission.

Essential Background Knowledge

The student should be aware of:

- a. rules of thumb associated with speed, distance and time;
- b. the affect of wind on flight;
- c. the triangle of wind velocities;
- d. watch-map-ground procedures;
- e. map reading techniques; and
- f. orienteering techniques.

Advice to Instructors

In low wind conditions demonstrate flight as a constant speed (perhaps 10 kts or 17 ft/sec) and show how to judge distance traveled as a function of time. 10 kts equates to 1000 ft per minute or one nautical mile in six minutes. Demonstrate the affect of wind by flying crosswind with a constant heading and noting the resultant track of the RPA. Explain the results of flight directly into wind and also downwind as it relates to groundspeed. Use of the VO can help with teaching the map reading techniques as, for example, if the VO is positioned near an object such as a significant tree the VO can indicate the relative position as the student approaches the object. This exercise may have to be spread out over two days, the first a day with light and variable winds and the second day being one with a steady wind. Conduct of this exercise from a hill may allow demonstration of the map reading techniques easier than flat terrain.

The instructor should brief orienteering skills to accommodate pilot movement during the navigation exercise. During the site survey, paths and trails should be studied to allow movement of the pilot during the mission.

Instruction and Student Practice

Start the instruction with a demonstration of distance, speed and time. The next portion of the training should be flight with wind to teach the student the results of wind on speed and direction of the RPA in forward flight. Following student practice and discussion of the practical effects of the triangle of velocities, demonstrate watch-map-ground procedures and other map reading procedures available to the stationary pilot. Progress the training to the point that the student and the instructor can travel on foot cross-country to extend the range of the RPA, all the while conducting accurate navigation.

3.18 EXERCISE 18. NIGHT FLYING

Objective

The objective of this exercise is to teach the student:

- a. how to conduct a thorough pre-flight inspection at night;
- b. how to take-off at night under varied conditions with and without the use of the area flood light;
- c. how to depart, enter, and fly an accurate circuit at night;
- d. how to conduct effective approaches and landings at night;
- e. techniques for effective pilot navigation at night; and
- f. how to correctly respond to emergencies at night.

Motivation

The main difference in operating at night is in the need to use aircraft lighting correctly and to bring extra caution to the procedures because of darkness. Darkness, and the absence of normal visual cues, requires that extra attention be given when flying at night.

Flying an accurate circuit at night requires the use of a combination of visual references and VO guidance in order to maintain correct position relative to the landing position and to other traffic. Achieving this accuracy is necessary and satisfying and it will benefit overall flying skill.

All emergencies that can be encountered during the day can and do occur at night, and when they do they bring additional complications. There are also emergencies which are unique to the night environment. The student must understand these emergency situations and be competent in carrying out prompt proper procedures — indecision costs time and time may be crucial.

Essential Background Knowledge

The student should be aware of:

- a. the aircraft lighting; success in night flying requires a good working knowledge of the aircraft lighting which means knowing what lighting is available, and how and when to use it;
- b. the human factors as they apply to night flying; subjects include night vision, kinesthetic illusions, visual illusions, autokinesis (<http://www.newworldencyclopedia.org/entry/Autokinesis>), black holes, pitch-up and down illusions, fatigue, and, if the training is conducted in winter, cold weather operations;
- c. the need for a serviceable flashlight;
- d. the importance and use of a written check list;
- e. the compulsory use of anti-collision lights and navigation lights;

- f. the importance of maintaining a positive rate of climb after take-off;
- g. no turns should be made below a safe altitude; and
- h. the difficulties associated with judgement of distance at night.

Advice to Instructors

Ensure that the student can locate all critical switches by touch. Introducing the first night take-off at twilight allows a gradual progression to darkness. Also, consider doing the first night approaches and landings at twilight to allow a gradual transition to night flying.

Ensure that the student determines and remembers wind direction and applies proper control input to compensate. Conduct the initial take-off in a well lit area. Emphasize the importance of take-off planning to include consideration of wind, runway surface, obstacles, turbulence, and vortices. Ensure that the student confirms a positive rate of climb after take-off.

Drift can be harder to determine at night but this assessment is necessary to fly an accurate circuit. Help the student to recognize and correctly compensate for drift in the circuit. Long sessions in a night circuit can be very tiring. Keep the trips reasonably short. Short trips out of the circuit and into the local area can be used to build pilot navigation skills.

Instruction and Student Practice

Demonstrate how to start the aircraft at night and demonstrate how to conduct a run-up at night. During hovering flight be aware of speed of motion. Teach courteous use of the strobe lights while operating at night.

Demonstrate and practise normal and crosswind take-offs.

Conduct a brief familiarization flight in the area.

Demonstrate and have the student practise circuits with varied approach and landing area lighting conditions, and practice emergency procedures, including electrical malfunctions and communication failure while in the circuit.

Demonstrate and have the student practise approaches and landings at night, gradually introducing variations such as crosswind, overshoots and different landing areas. Include straight-in approaches. Also demonstrate simulated system failures, such as loss of lights, landing light, or radio failure.

Point out any illusions that may be experienced on approach and landing at night.

Demonstrate to the student map reading and judging distances.

Supervise student night navigation practice, including: pre-flight planning, departure, en route navigation, arrival and emergencies.

3.19 EXERCISE 19. MULTIROTOR TYPE CONVERSION

Objective

The objective of this exercise is to teach the student how to conduct a self-learning program to become familiar with a new RPA system or subsystem. The pace of introduction of new technology coming available to flight crews is rapid with new equipment being introduced every week. Once a pilot has completed flight training he or she will be introduced to new systems that were not part of the training program. A mature pilot will be able to conduct a self-learning program to become safe and effective at using the new systems and subsystems.

Motivation

In order to conduct safe operations, the mature pilot will be able to learn about and become proficient in the use of RPAS systems that are different or more advanced than those upon which they trained.

Essential Background Knowledge

Using the RPA Flight System Manual and Operations Manual, explain the various procedures or techniques as applicable to:

- a. weight and balance, loading;
- b. power systems and management, consumption, range;
- c. ancillary controls — use and operation;
- d. undercarriage operation, if applicable;
- e. electrical systems;
- f. operational considerations, including approved flows and checks; and
- g. emergency procedures.

Examine the student on essential information and correct any errors as necessary.

Advice to Instructors

Resist the temptation to "shoot a couple of circuits" and then let the student learn by mistakes made when flying solo. Carefully assess the student's background and ability so as to plan a conversion course to individual needs.

In some cases, type conversion also includes introducing the students to equipment with which they have had no previous experience, e.g., moving map displays, retractable undercarriage, different payloads, etc. As this equipment is also normally associated with heavier equipment, pace the instruction with the student's ability to learn.

Encourage students to become familiar with all the information in the RPA manuals, and ensure that they appreciate that aircraft of the same type, but of different years of manufacture, may have other operational restrictions.

If the student has had limited or no experience on similar types, spend some time on normal air work before progressing into the more complicated techniques to enable the student to feel at ease with the aircraft.

A "check-out" is not complete until the student has been exposed to the characteristics of the aircraft in all configurations, including operations at maximum gross weight.

Instruction and Student Practice

Acquaint the student fully with the essential differences or additional items which must be checked during the external inspection of the RPA.

Supervise starting and pre-take-off checks.

After take-off, allow sufficient time in the hover and in level flight to allow the student to become familiar with the flight characteristics before commencing more complicated instruction.

When the student is at ease with the aircraft in all normal hovering and flight manoeuvres, join the circuit for departure and approach and landing practice.

After sufficient competency is demonstrated by the student, assign practice as required.

3.20 EXERCISE 20. EMERGENCY PROCEDURES

Objective

The objective is to teach the student how to recognize an emergency condition or system malfunction and how to complete all emergency procedures in accordance with the Operations Manual and checklists.

Motivation

When an abnormal or unsafe condition is detected, a pilot must correctly assess the situation, then carry out the proper procedure to resolve the problem. Alternative action must also be considered if the pilot is not able to fully resolve a system malfunction. The alternative may be to divert to a field or clearing nearby.

Essential Background Knowledge

- a. Review decision making concepts and handling emergencies.
- b. Explain, for the RPAS being used, the procedures for:
 - (1) loss of radio link,
 - (2) electrical system malfunction,
 - (3) battery fire on the ground,
 - (4) electrical or battery smoke or fire,
 - (5) loss of orientation,
 - (6) insect sting or aggressive animal in the vicinity,
 - (7) low voltage,
 - (8) high vibrations,
 - (9) loose component in-flight,
 - (10) ditching, and
 - (11) other systems failures applicable to the RPAS type.

Advice to Instructors

Ensure the student is familiar with normal procedures and is handling the RPA well before introducing emergencies and system failures.

It is important that the student be familiar with the Operations Manual format, including all emergency checklists and emergency procedures. Instructors must ensure that the student learns memory items.

Emergency procedures should be introduced progressively in the training and not left to the later stages of training. Situations involving electrical or battery problems can be given in the initial training stages.

Teach emergency procedures by presenting scenarios. This will assist students in analyzing problems, and will prepare them better for actual situations. Always promote the development of sound decision-making skills.

Be careful not to overload the student with emergencies. Keep the scenarios reasonable and realistic. Avoid multiple emergencies, the student will become frustrated and little knowledge or skill will be gained.

Ensure that all emergency and system failure procedures have been reviewed and practiced by the end of flight training. Any procedure applicable to the RPAS and used in training could be tested by the examiner.

When teaching emergency procedures, do not create situations that add risk to the flight. In other words, do not practise accidents.

Precede all practice emergencies with the word "simulated".

Instruction and Student Practice

All emergency and systems failure procedures applicable to the aeroplane type are to be taught in accordance with the Operations Manual.

Discuss emergencies with the student, using scenarios to help visualize what can happen.

With the student holding the hand controller, go through the procedures, calling each item out loud and touching or moving the various controls.

Question the student on memory items if applicable. The student must know where to locate all emergency checklist items.

3.21 EXERCISE 21. FLIGHT DURING BVLOS OPERATIONS

Objective

The objective of the BVLOS flight exercise is to teach the RPAS pilot how to transition from VLOS operations to BVLOS flight and back again. Flight during BVLOS will also be learned to ensure that safety of flight is maintained, and the mission objectives are accomplished if extended distance operations are warranted.

Motivation

In many cases, VLOS is limited to distances of approximately 0.5 nm as the pilot attempts to maintain positive RPA clearance from and amongst tree lines and bluffs. On many occasions First Responders will need to fly a further to complete their life saving missions. Additionally, package delivery involves extended ranges. Transit is a basic building block to more advance BVLOS manoeuvres.

Although the concept of flight control in BVLOS is trivial (essentially identical to VLOS flight), the sources of information used to maintain an accurate flight path changes considerably once BVLOS is established. Yes, the pilot will be able to see the RPA for some of the operations, but navigation and flight control will necessitate use of the pilot display mounted on the hand controller, and input from the VO and support personnel in the operational area.

Essential Background Knowledge

The student must have a working knowledge of the following:

- a. information contained in InDro Flight Exercises 2 to 8, 12 to 17, and 20;
- b. flight controller responses to loss of the C&C link;
- c. Pilot-VO SOPs for BVLOS operations;
- d. Pilot-Payload Operator (PO) SOPs, if a PO used;
- e. First Person View (FPV) flight techniques;
- f. waypoint flight; and
- g. advanced navigation (watch, map, ground; ETE and ETA; etc.) techniques.

Visual Line of Sight (VLOS) – means unaided (corrective lenses and/or sunglasses exempted) visual contact with the aircraft sufficient to be able to maintain operational control of the aircraft, know its location, and be able to scan the airspace in which it is operating to decisively see and avoid other air traffic or objects.

Advice to Instructors

The concepts associated with BVLOS expand the mission capabilities of the RPAS pilot. In the rural setting, the pilot may add many kilometers to the range of the RPA. Understandably, the training required to gain these additional kilometers is considerable.

First one must be aware of the limitations contained within the SFOC that will be in effect for flight operations. These include the Advance Operations Designation issued by Transport Canada, the limitations contained within the operator's (InDro's) SFOC application, and the limitations established by the operational authority for mission flight activities.

Instruction and Student Practice

The instructor should commence BVLOS training by emphasising that control of the RPA is essentially the same as VLOS flight. The graphics presented by the DJI Go App or other flight control app remain unchanged. The instructor should also stress that the pilot will still be able to maintain visual contact with the RPA for some of the mission. However, information obtained from looking at the air vehicle is not sufficient to maintain clearance from obstacles, know its location or maintain operational control of the aircraft. Also, once one looks down at the video image, reacquiring the air vehicle may take valuable time. At some point, it will be necessary for the pilot to use the hand controller display and input from the VO to continue a transit.

It is not necessary to begin training BVLOS by flying at a distance; rather, the instructor should have the student go “eyes down” while the VO maintains visual contact with the RPA and can warn of obstacles or other air traffic. Use of a head mounted instrument flying hood should be considered.



In order to conduct flight in BVLOS the pilot should employ the pilot cam, or select the payload camera to FPV mode. Plan in advance for bright conditions in the field, conditions that may wash out the display image. Normal Crew Resource Management (CRM) techniques for keeping the VO mode aware should be maintained. Once BVLOS flight is established, the VO is not responsible for avoiding controlled flight into terrain, but is responsible for avoiding other air traffic. Naturally enough, all crew members assist with obstacle and terrain clearance at all times.

Navigation when referencing the video output or the moving map will take more attentional demand than when flying VLOS. If the moving map is presented on the display, the pilot will be flying blind with respect to objects and terrain, and if the FPV camera image is displayed then the pilot will not have the benefit of the map. Toggling between the two display formats can be practiced with full support of the VO, to keep a lookout during VLOS activities. The instructor should guide the student through all basic navigation skills such as GPS waypoint flight, maintaining a heading, tracking in the desired direction, recognizing features on the ground and comparing them to the map (what is on the map is on the ground, but not vice-versa), etc.

Converting back to VLOS should be accomplished at the discretion of the pilot, although the VO will assist with indicating when VLOS has been achieved. CRM and mode awareness must be maintained at all times.

An effective tool to use for BVLOS practice is to establish a round robin route around the flight crew. This makes RPA viewing angles oblique to the normal pilot viewing angles allowing representative flight without actually flying long distances to achieve actual BVLOS conditions.

3.22 EXERCISE 22. BVLOS SEARCH

Objective

The objective of the search exercise is to teach the student how to reconnoiter an area during BVLOS operations. Imaging may be required to search for an object or person, to provide general situational awareness to an Incident Commander, or to select a site for landing or deliver of a package.

Motivation

Operations in BVLOS invariably require a task to be conducted while the RPA is at an extended range from the pilot. With the use of a camera as the primary (and required) sensor, search will be part of the tasking.

Essential Background Knowledge

In order to conduct a search in BVLOS the pilot should have an understanding of the advanced modes available with the flight controller in use. The primary flight mode will be a GPS hold function and the associated movement of the RPA from one 3-D fixed position to another. A second function that should be taught is the Point of View circle around a point with the camera trained at the centre of the circle.

During transit, the camera is made available to the pilot for collision avoidance and navigation. During a search activity, the camera is used for search by a payload operator. SOPs for effective communication with the Payload Operator are essential to safe operations.

Advice to Instructors

Ensure that the student has mastered the basics of BVLOS transit prior to manoeuvring at low speed. Wind can affect the learning if the student has not grasped the concept of a triangle of velocities. This is best taught during the transit phase of learning.

During forward flight, the pilot is always flying into a volume of air that has been cleared. During slow speed manoeuvring flight, this same concept must be maintained. Sideward or backward flight must be discouraged if the RPA is at lower heights Above Ground Level (AGL).

Once again, start with the RPA in close proximity to the student (approximately 200 to 300 feet range) and have the student either not look at the RPA ("eyes down") or use the blind flying hood. If the instructor wishes to add realism, they may manoeuvre the RPA to a nearby location (without the student looking) prior to starting the exercise.

Prior to commencement of this exercise, review with the student and the VO the STOP, STOP, STOP emergency command.

Instruction and Student Practice

This exercise will include:

- a. station keeping over search area;
- b. maintaining clearance as required by the SFOC;
- c. use of intelligent flight modes during BVLOS; and
- d. CRM during BVLOS payload camera search.

3.23 EXERCISE 23. LANDING IN A BVLOS CONFINED AREA

Objective

This exercise is intended to teach the student how to safely conduct a landing while flying in a regime of BVLOS.

Motivation

During BVLOS operations, there are many occasions when it will be necessary to conduct a landing when the RPA is not in the immediate vicinity of the pilot. Learning to land safely and effectively is a skill that will be used over and over.

Essential Background Knowledge

The student must be cognisant of all advanced flight controller modes associated with auto-land manoeuvres. This must also include an awareness of the lost link response of the air vehicle in the event that the C&C link is severed during the landing sequence.

Advice to Instructors

Prior to conducting landings in a confined area, the student should become proficient with landing and the procedures for landing in an open field. A target which represents the centre of the “confined area” may be used.

With the camera pointing down, to provide clearance from obstacles and to avoiding landing on or near persons and animals, disorientation may occur. This should be discussed in detail and emergency responses to vertigo or “the leans” reviewed.

Instruction and Student Practice

Placing a second VO, equipped with a crew radio, is a suitable method of ameliorating risk during this training session.

Landing at a location identified during the search phase of a mission should commence with a high recce which involves manoeuvring the RPA at a height that is well clear of obstructions. The Payload Operator, if available, will move the camera gimbal at the direction of the pilot to allow an assessment of the following aspects of the landing area:

- a. size;
- b. shape;
- c. surface;
- d. slope;
- e. undershoot and overshoot;
- f. debris;
- g. landing spot; and
- h. relative direction of the sun.

In essence, this may be considered a site survey and would, on some occasions, need to address all the elements of a site survey.

Following the high recce and after the conduct of a pre-landing check, the student will be required to hover directly over the eventual landing point and descend to a height that allows a search for

objects such as clothes-lines or telephone lines that may stretch over a clearing. This is called the low recce and allows for a final search of obstructions.

Control of the camera should be at the pilot's discretion and should be pointed straight down at the start of the landing. Pointing the camera at an oblique angle that includes the horizon within the field of view may assist with SA. Normally the BVLOS landing will be carried out as an automated manoeuvre. The pilot should be prepared to abort the landing at any time in the event of an unplanned event. The most obvious example is a dog chasing the RPA. Following an aborted landing the RPA should be returned to the low recce hover position or moved away if persons approach. The student should verbalise intentions during low level flight.

Early in the training program landings should be practiced as a method for aircraft avoidance during BVLOS operations.

3.24 EXERCISE 24. BVLOS FLIGHT TECHNIQUES

Objective

This exercise is intended to teach the student how to safely conduct BVLOS flight elements which are required for the conduct of long-range transits.

Motivation

During BVLOS operations, the pilot relies more heavily on the “First Person View” concepts of operation rather than direct line of sight SA. Learning to conduct mission activities safely and effectively is a skill that will be used over and over.

Essential Background Knowledge

The student must be cognisant of all aspects of Exercise 21, Flight During BVLOS Operations.

Advice to Instructors

BVLOS flight will be successful if the flight crew approach the mission understanding that it is much more complex than it originally appears. Good airmanship is essential to safe and effective missions. As an instructor, you will be required to show leadership by demonstrating good airmanship throughout the BVLOS elements detailed below.

It needs to be emphasized in the ground training the difference between flying under Part IX, and flying under a SFOC Special Authorizations. This a knowledge gap in industry at the moment.

We already have in the SOPs that the VO will inform the PIC when he goes BVLOS, and the PIC will acknowledge but the intent is to have the PIC understand the transition and all that goes with it.

A PIC making the decision to switch modes from VLOS to BVLOS, must verbalise to crew that the transition is planned and what the intent is. Once the decision is made to operate BVLOS the PIC should follow their training to maintain safe and effective operation of the RPA, as well as following SOPs for BVLOS flight that account for the increased risk and necessary mitigation procedures.

It must be stressed that under Part IX of the Canadian Aviation Regulations, any person/entity wishing to operate an RPAS Beyond Visual Line of Sight must have an approved SFOC indicating that BVLOS flights are authorized.

Instruction and Student Practice

Placing a second VO, equipped with a crew radio, is a suitable method of ameliorating risks during this training session.

General

The procedures used for BVLOS flight have been prepared to allow safe flight without the pilot or VO specifically viewing the air vehicle. General comments/procedures are as follows:

- a. **Flight Planning.** Flight within VLOS involves a map study (as part of the site survey) and visual awareness of the RPA's location with respect to terrain or

obstacles. The distances involved with flight BVLOS may require an expanded site survey that includes flight planning. This is required in order to maintain situational awareness, both of the relative bearing of the RPA but also amp hours remaining in relation to the distance to be flown and wind encountered.

- b. **Mission Applicability.** The BVLOS procedures itemized below are intended for use by First Responders including the Royal Canadian Mounted Police, Provincial Police, Paramedics, Fire-Rescue and Search and Rescue. They are prepared for actual operational missions, training for such missions and demonstrations of such missions.
- c. **Flight at Altitude.** When BVLOS operations up to 700 ft are required, normal SOPs will be applied for flight above 400 feet AGL, that is to say, there are no specialized SOPs for BVLOS operations between 400 feet AGL and 700 feet AGL.
- d. **Flight over People.** The general procedures used for flight over people will be adhered to during flight BVLOS. As with flight within VLOS, an Advanced Pilot is required, an Advanced RPA is required, and TC approved procedures are required.
- e. **Night Flying.** Normal SOPs for night flight will be adhered to during BVLOS flight at night. The RPA must be equipped with the proper lighting.

BVLOS Cross Country Flight Planning

In preparation for BVLOS flight the pilot will use basic pre-flight navigation planning techniques, including:

Map study and map preparation. Map study will be undertaken with both a current VFR Navigational Chart (VNC) or VFR Terminal Area Chart (VTA) of the area (digital charts such as those contained in ForeFlight are acceptable), and a 1:50,000 map or scaled Google Map print-out of the area. Unlike manned flight, RPAS navigation planning will use desired track and heading as the same value in degrees in that the onboard flight controller establishes steady heading sideslips to compensate for wind. If the pilot is concerned about violating height limitations, waypoints will be set as points wherein the pilot will adjust Height Above Launch in order to maintain a constant height AGL along the route. Distances will be measured in nautical miles. There is no requirement to calculate magnetic values because all tracks and heading will be conducted in true values.

Preparation of a Flight Planning Form. For cross country flights and round robins, a flight planning form will be completed. The pilot may use a form of their choosing, but it must contain the information shown in Figure 3-1. Battery remaining will be used instead of fuel, and the reserve on landing will be planned to be not less than 30%.

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Completion of a Pilot Navigation Log Card. Relevant information calculated on the flight planning form will be transferred to a Pilot Navigation Log Card which will be used throughout the cross-country flight. As noted above the track and heading values will be the same for RPAS flight. Additionally, the ground speed will be maintained by the RPAS flight controller and set to a value preferred by the pilot. The log card used is up to the discretion of the pilot but must be similar to Figure 3-2.

RPAS PILOT NAVIGATION LOG CARD

InDro FORM 4256

DATE	PILOT	VO	AIRCRAFT	TIMES					BATT / MIN
				START UP	TRACK	G/S	DISTANCE	ETE / ETA	
Time	FROM	TO	TAS	HEIGHT AGL/ALL	TRACK	G/S	DISTANCE	ETE / ETA	BATT REM

Figure 3-2 Sample Pilot Navigation Log Card

Transition from VLOS to BVLOS Flight at Medium Altitude

- (1) Observation by the VO that the RPAS is about to enter a BVLOS situation.
- (2) The VO will be responsible for remaining aware of the bearing to the RPAS and scanning of the surrounding airspace. Either the pilot or the VO will monitor Automatic Dependent Surveillance–Broadcast (ADS-B) for aircraft in the operating area.
- (3) Verbally inform the pilot that the RPAS is about to enter BVLOS conditions
- (4) Pilot will acknowledge that the RPAS is entering BVLOS and continue advising the VO when the pilot is “eyes in” or “eyes out”.
- (5) Pilot will advise of battery status and operational status (normal, camera malfunction, etc.).

Transition from VLOS to BVLOS Flight at Low Altitude

During the transition from flight within VLOS to flight BVLOS it is normal that for a short period of time the VO will be required to maintain clearance of the air vehicle from obstacles and terrain. FPV procedures will be used during the normal period of the transition from VLOS to BVLOS.

- (1) The VO will advise the pilot that they are about to enter BVLOS at low altitude.
- (2) The pilot will ensure that the speed of the RPAS is slow enough to take immediate action to avoid a collision with an obstacle or terrain.
- (3) The pilot will ensure (if desirable) that all collision avoidance sensors (including pilot cam) are operating properly.
- (4) The pilot will ensure that no objects exist above the RPAS that would create a collision should a lost link failsafe be initiated.
- (5) The VO will advise the operator that they have lost site of the RPAS
- (6) The Pilot will stop transitional movement and scan 360 in order to gain situational awareness.
 - Scanning for people and property that may be in the operational area.
 - Pilot will advise of battery status and operational status (normal, camera malfunction etc.)
 - If a risk of collision exists with people or property, the pilot will either land immediately, or gain altitude, whichever is safer to the people or property.
- (7) The VO will continue to scan the airspace.

BVLOS Navigation Procedures

During BVLOS flight the pilot will use basic in-flight navigation techniques:

- (1) Set heading procedures.
- (2) Establish pinpoints at checkpoints.
- (3) Adjust heading as required.
- (4) Adjust timings as required.
- (5) Turn procedures (Time, Turn, Track, Talk, Estimate, Estimate).
- (6) Watch, map ground techniques.
- (7) Standard diversion procedures.

Transition from BVLOS to VLOS Flight at Medium Altitude

- (1) The pilot will advise the VO that the RPAS will reappear from BVLOS flight and provide a bearing to the air vehicle.
- (2) The VO will remain “eyes up” until the RPAS is acquired visually. The VO will advise the pilot that the air vehicle can be seen and will advise if it is close enough to be considered within VLOS.
- (3) Once the pilot judges the flight condition to be within VLOS the pilot will announce “Within Visual Line of Sight” to the VO and Ground Supervisor (if present).
- (4) The pilot will advise of their intentions (continue with mission, return home)
- (5) The VO will continue to monitor the surrounding airspace.
- (6) The pilot/VO will follow existing VLOS SOPs.

Transition from BVLOS to VLOS Flight at a Low Altitude

- (1) The Pilot will announce their intention prior to transitioning out of BVLOS at low altitude.
- (2) The VO will observe the airspace into which the RPAS will be entering.
- (3) Once the VO announces that the airspace is clear the pilot will transition into VLOS from a low altitude BVLOS situation.
- (4) Once in the VLOS condition that pilot will advise their intentions and flight platform status.
- (5) The pilot/VO will follow existing VLOS SOPs.

Extended Range BVLOS Landing of an RPAS

- (1) The Pilot and VO will follow BVLOS procedures outlined above.
- (2) Once in the location where the pilot intends to land, the pilot will announce their intention to land and indicate if the area is clear for a safe landing.
- (3) At all phases of the landing the crew will use the payload(s) to scan the landing area for any incursions.
- (4) Should a person or animal enter the landing zone, the landing shall be paused and/or aborted until a safe landing can be conducted at this or a possible alternate landing site.
- (5) The RPAS shall be descended at a slow enough rate that the descent can be paused or aborted if an emergency situation presented itself.

Extended Range BVLOS Launch of an RPAS

- (1) Prior to launch the VO must scan the airspace into which the air vehicle will be launched.
- (2) The Pilot will announce their intention to launch the RPAS. This will be acknowledged by the remainder of the crew.
- (3) All available sensors will be utilized to maintain situational awareness of the area surrounding the RPAS during the ascent.
- (4) The VO will transmit the RPAS activities to all local air traffic if applicable and required by ATC.
- (5) Once clear, the crew will follow all applicable SOP's during different phases of flight.

Maneuvering BVLOS in a Confined Area

- (1) The crew will follow previously learned procedures for a high recce and if necessary, during descent, a low recce.
- (2) The crew will use all available sensors to monitor the flight of the RPAS and/or its intended target.
- (3) The RPAS will only operate at an altitude and speed that maintains a safe operational margin from people or animals in its vicinity.
- (4) Flight of the RPAS will remain at a sufficient distance from people, animals or property required to maintain a safe operational environment.

Dropping a Package BVLOS at a Specific Location

- (1) The RPAS crew will follow all applicable SOPs in order transition to and from the location for dropping the subject package.

- (2) The pilot will announce to the crew that they have reached the area above the drop location and are ready to descend.
- (3) The RPAS camera will be used to scan the area of the drop zone prior to descending in order to determine that the area is clear of obstructions and people.
- (4) The pilot will announce that they are descending to “drop altitude”. This announcement will be acknowledged by the VO.
- (5) Once at drop altitude, the pilot will announce “dropping ‘payload’” prior to releasing the load.
- (6) Once the load has been released, the pilot will climb to altitude and again scan the drop area to ensure complete mission status.
- (7) The crew will follow all applicable SOPs in order to return home and complete their mission.

Tactical (Low Level) BVLOS Flight

- (1) **Flight above and then at the height of obstructions while following directions from the PO.** During flight BVLOS the PO will request that the pilot move the aircraft to improve or anticipate the next photo or video clip. SOPs will be followed to reposition the aircraft while maintaining clearance from obstacles. This will be accomplished at two heights: well above obstacles, 100 ft clearance and again just above obstacles, 20 ft clearance. It is noted that for some systems the pilot takes on the role of PO.
- (2) **Flight below the height of obstacles in the vicinity.** This task is similar to the one just above, except that the pilot manoeuvres the UA based on any and/or all information available to him or her. In an urban environment, this task typically would involve moving the RPA below the height of building, flags or towers on a city street. Hover and Maneuver accuracy could be affected by crew situational awareness, GPS loss of satellite coverage and environmental / landscape / Electro-Magnetic Interference (EMI) effects. The variance in accuracy is to be measured in the BVLOS confined area (and its probable cause identified).

3.25 OPERATIONS AT ADVERTISED EVENTS

Procedures for First Responder operations at advertised events shall be taught prior to the conduct of these operations. Teaching points are as follows. Refer to InDro SOPs for further details.

- a. First Responders are often called upon by the organizers of an advertised event to assist with the planning and on-site medical needs of advertised events of all sizes throughout the province. As a result, the RPAS team may be called upon to operate the RPAS at and over an advertised event.

- b. Under Part IX of the CARs, "... the pilot shall operate the RPAS in accordance with any additional limitations or restrictions provided by the Advertised Event Organization."
- c. RPAS crews shall coordinate with event staff to ensure all limitations or restrictions are complied with. As listed in the TC Aeronautical Information Manual, an SFOC is required when operating less than 100 feet from the boundaries of an advertised event (CAR 901.41 and 903.01). The perimeter of such events (outdoor events such as concerts, performances, festivals, markets, or sporting events, etc.) are limited by perimeter fences and at the gates where people are restricted by the event personnel, volunteers, and security or peace officers. Where no such perimeter is defined for outdoor advertised events, it is expected that the boundaries of the advertised event be at least 100 feet from people participating in the advertised event and 100 feet from the track of the sporting event for all categories of RPA pilot certificates and models of RPAs.
- d. Should the need arise for BVLOS operations, the crew shall follow the established procedures for BVLOS.
- e. The RPAS will be operated at a safe altitude to provide optimal coverage of the venue and limit its maneuverability to areas safe from pedestrian and vehicular traffic unless a need arises for a better vantage point of a serious and potentially life threatening event.

3.26 FLIGHTS OVER 400 FEET ABOVE GROUND LEVEL

Procedures for First Responder operations at heights above 400 ft AGL shall be taught prior to the conduct of these operations. Teaching points are as follows. Refer to InDro SOPs for further details.

- a. Flights over 400 feet AGL pose an increased risk to manned aviation and shall be limited to "exceptional or exigent" circumstances.
- b. Knowledge of the airspace is crucial and the RPAS crew must remain vigilant of any conflicts that the operation may pose with manned aircraft.
- c. Radio calls in the blind shall be conducted with position reports and altitude ASL (Above Sea Level).
- d. Should a conflict with manned aircraft arise, the RPAS shall descend immediately to a safe altitude until such time as there is no longer a conflict.
- e. The operational time above 400 feet AGL shall be limited to the time required to achieve the objective.
- f. If a prolonged flight(s) is/are required above 400 feet, a NOTAM or 5.1 NOTAM shall be requested and a second visual observer shall be added to the crew to optimize situational and airspace awareness.
- g. In controlled airspace the pilot will contact the controlling agency responsible for the airspace and remain below 400 feet AGL unless a higher altitude is authorized by the controlling agency.

- h. With authorization, the pilot may operate at an altitude greater than 400 feet AGL, provided that the pilot complies with all operating procedures.
- i. Where a requirement for BVLOS exists, the pilot will follow the established procedures for BVLOS flight.

3.27 OPERATIONS WITHIN 3 NM OF DND AERODROME

Procedures for operations within 3 NM of a DND aerodrome shall be taught prior to the conduct of these operations. Teaching points are as follows. Refer to InDro SOPs for further details.

- a. Operations within 3 NM (5.6 km) of an aerodrome operated under the authority of the Minister of National Defense is possible when performed in accordance with a Special Flight Operations Certificate.
- b. Pilots must receive authorization from the Base/Range Control Officer and/or the Base Wing Commander and/or DND Air Traffic Service Provider responsible for the area of operations.
- c. Pilots must also adhere to any additional requirements, restrictions, or limitations imposed by the aforementioned entities. Class F airspace (CYR/CYD)
- d. Operations in any class of Department of National Defense (DND) controlled airspace will only be conducted with the permission of the applicable operating authority. SFOC's that permit operations within any military airspace will be contingent on the approval of DND.

3.28 NON-AUTHORIZED OPERATIONS IN CIVILIAN CONTROLLED DOMESTIC AIRSPACE

Procedures for First Responder operations in civilian controlled domestic airspace without gaining an authorization from the provider of air traffic services shall be taught prior to the conduct of these operations. Teaching points are as follows. Refer to InDro SOPs for further details.

- a. The operation must be for the purposes of preventing immediate risk to human life, or a major incident which is beyond the scope of business-as-usual operations, and is likely to involve serious harm, damage, disruption or risk to human life or welfare, essential services, the environment or national security.
- b. The pilot will operate the drone at 400 ft AGL or lower.
- c. A visual observer must be used.
- d. The pilot must always maintain immediate contact with their crew members.
- e. The pilot must make all reasonable efforts to contact the local NAV CANADA unit and advise them of the operation including the location of the operation and the pilot's contact details.
- f. The pilot must be contactable by the NAV CANADA unit at all times during the operation via the contact details provided.
- g. The pilot shall inform NAV CANADA at the end of the operation.

4 FLIGHT TRAINING LESSON PLANS

4.1 RPAS PILOT FLIGHT TRAINING SYLLABUS

Lesson Plans for the RPAS Flight Training Syllabus, which follow, provide guidance for the new instructor, and a ready reference for the more experienced instructor. Flight times are not specified since it is essential that the required competency in each exercise is achieved, regardless of the flight time involved, before proceeding with the next lesson.

While it is recommended that flight instructors carefully follow these Lesson Plans as outlined, the personal instructional techniques of an individual flight instructor may be cause for modification of this syllabus, in which case, it should be committed to writing and followed with care. In either case, special circumstances such as air vehicle availability, geographic location, or weather conditions may necessitate a departure from the written numerical order of the Lesson Plans.

It must be clearly understood that each Lesson Plan does not necessarily constitute a single flight or session — the number of flights will vary according to Lesson Plan content and student ability. The reference manual for the material contained in the Lesson Plans is Transport Canada's Flight Training Manual. Training aids will vary according to the subject, but a model RPA (or the actual RPA if it is small enough), white board, and aircraft flight manual are practically essential in each case.

To ensure that the student understands exactly what will take place during the air exercise, a pre-flight briefing will be carried out. This is essentially a practical briefing using the "Air Instructions" as a guide, avoiding theory, but including the important aspects:

- a. What we are going to do.
- b. How we are going to do it.
- c. Safety considerations.

The pre-flight briefing should be conducted just prior to the air exercise. Key points of the proposed flight should be reviewed and the student questioned briefly to determine that there is sufficient understanding to proceed with the air exercise.

Each lesson plan outlines the air exercises which should be taught, practised or reviewed, and also states the expected level of competency at that stage of the student's training. Bearing in mind that perfection is the goal, during each successive flight, the instructor should impose performance standards with that goal in mind.

Following the Learning Factor of Primacy, provision has been made whenever possible, to give a brief demonstration of any new exercise which will be taught during the next training period. It need not necessarily be accompanied by an in-flight explanation and is essentially a familiarization demonstration, which will enable the student to more fully understand the subsequent instructor's briefing.

A brief discussion (post-flight debriefing) conducted at the conclusion of the training flight is essential to give the student an opportunity to discuss, and obtain clarification of any points involved in the lesson. Study assignments to help the student prepare for the next lesson should be made as part of the post-flight debriefing.

4.2 PRE-FLIGHT BRIEFING

The following subsection was informed by Ref. B, Transport Canada, TP 975E, Flight Instructor Guide Aeroplane, revised 9/2004.

A pre-flight briefing is a discussion on a one-to-one basis just prior to the conduct of an air exercise to ensure that the student understands exactly what will take place. This is essentially a practical briefing on the Air Instruction portion of the flight exercises in the previous subsection of this document, avoiding theory but including the important aspects:

- a. what are we going to do;
- b. how are we going to do it; and,
- c. safety considerations.

This is separate from the ground presentations. It should precede all flights, whether or not there is a new exercise to be covered. It is also particularly important when sending a student solo. Points that should be covered include:

- a. meteorological and operating area conditions, and Notices to Airmen (NOTAMs);
- b. the RPAS to be used, its power state and other relevant information;
- c. where the exercises will be conducted;
- d. departure time, duration of mission and time when the crew will be back at base;
- e. the sequence of exercises to be covered during the sortie; and,
- f. a review of relevant airmanship points and decision-making situations expected during the flight.

4.3 POST-FLIGHT BRIEFING (DEBRIEFING)

During the debriefing, review with the student each exercise undertaken during the flight. In the case of a dual flight, the debriefing should include strengths and weaknesses and suggestions to improve performance. An outline of the next training session should be given along with study assignments.

A debriefing should follow all flights, dual and solo. Points should include:

- a. The student's own assessment of the flight and performance.
- b. Your assessment of the student's performance. This should include both the strong and weak points, and advice on how to correct any errors.
- c. Answering any question the student may have.
- d. Assigning study subjects where appropriate.

4.4 LESSON PLAN NO. 1

The first lesson consists of an introduction to the aircraft and its major components, the Pilot Operating Handbook and its operational documents. This should be followed by a familiarization flight and some basic instruction. This lesson plan should be considered as applicable to one outing of multiple flights.

1.0 Pre-flight briefing	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.					
Familiarization	♠				
RPAS Familiarization and Preparation for Flight	♠				
Hand Controller	♠				
Take-off, Hover and Landing	♠				
Attitudes and Movements	♠				
Vertical Flight and Height Hold	♠				
Lateral and Longitudinal Flight	♠				
Translating Flight	♠				
Hovering Turns	♠				
Circular Flight about Pilot	♠				
Walking the Dog	♠				
Figure of Eights	♠				
Approach and Landing	♠				
The Circuit	♠				

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Preparation for Flight
 - Take-off, Hover and Landing
 - Hovering Flight

4.5 LESSON PLAN NO. 2

This lesson is the first instructional lesson associated with RPAS flight. It consists of hover work with the RPA consistently pointing into the wind. The flight mode selected for the exercises contained in this lesson plan are at the discretion of the instructor, however it is fundamental that the training progress from the known to the unknown or building from simple to complex. Initiating these exercises with a “difficult to fly” flight mode is counterproductive.

Although this lesson plan is designed to be accommodated in one outing, the instructor should judge the progress of the student on this plan and the following plans, and organize additional outings if required.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
RPAS Familiarization and Preparation for Flight		♠			
Hand Controller		♠			
Take-off, Hover and Landing		♠			
Attitudes and Movements		♠			
Vertical Flight and Height Hold		♠			
Lateral and Longitudinal Flight		♠			
Translating Flight		♠			
Hovering Turns	♠				
Circular Flight about Pilot	♠				
Walking the Dog	♠				
Figure of Eights	♠				

- | | |
|---------------------------|--|
| 2. Post-flight debriefing | <ul style="list-style-type: none"> • Question the student and clarify any problems which may have arisen • Assign study material for next lesson |
| 3. Preview of next lesson | <ul style="list-style-type: none"> • Hovering Turns • Figure of Eights |

4.6 LESSON PLAN NO. 3

This lesson will involve demonstration and practice of RPAS flight during hovering flight including turns and figure of eight pattern (coordinated (or banked) turns).

1.0 Pre-flight briefing	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.					
RPAS Familiarization and Preparation for Flight			♠		
Hand Controller			♠		
Take-off, Hover and Landing			♠		
Attitudes and Movements			♠		
Vertical Flight and Height Hold			♠		
Lateral and Longitudinal Flight			♠		
Translating Flight		♠			
Hovering Turns		♠			
Circular Flight about Pilot		♠			
Walking the Dog		♠			
Figure of Eights		♠			
Approach and Landing	♠				
The Circuit	♠				

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Hovering Work
 - The Circuit
 - Approach and Landing

4.7 LESSON PLAN NO. 4

This lesson progresses the students training to include flight beyond the hover to include the circuit.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Attitudes and Movements			♠		
Vertical Flight and Height Hold			♠		
Lateral and Longitudinal Flight			♠		
Translating Flight			♠		
Hovering Turns			♠		
Circular Flight about Pilot		♠			
Walking the Dog		♠			
Figure of Eights		♠			
Approach and Landing		♠			
The Circuit		♠			
Emergency Procedures	♠				

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Emergency Procedures

4.8 LESSON PLAN NO. 5

This lesson continues the previous exercises with demonstration and practice of hovering flight and flight in the circuit. In addition, emergency procedures are demonstrated and practiced.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Translating Flight			♠		
Hovering Turns			♠		
Circular Flight about Pilot			♠		
Walking the Dog			♠		
Figure of Eights			♠		
Approach and Landing		♠			
The Circuit		♠			
Low Flying	♠				
Precautionary and Forces Landings	♠				
Pilot Navigation					
Night Flying					
Multirotor Type Conversion					
Emergency Procedures		♠			

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Solo Practice

4.9 LESSON PLAN NO. 6 (SOLO PRACTICE)

This lesson is a solo flight, which permits the student to practice hovering flight on his or her own time and speed. The instructor may or may not be present.

1.0 Pre-flight briefing	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.					
Take-off, Hover and Landing					♠
Attitudes and Movements					♠
Vertical Flight and Height Hold					♠
Lateral and Longitudinal Flight					♠
Translating Flight					♠
Hovering Turns					♠
Circular Flight about Pilot					♠
Walking the Dog					♠
Figure of Eights					♠

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Low Flying
 - Precautionary and Forces Landings
 - Emergency Procedures

4.10 LESSON PLAN NO. 7

This lesson involves operations at a distance, operations such as low flight and precautionary and forces landings. Emergency procedures continue to be demonstrated and practiced.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Circular Flight about Pilot			♠		
Walking the Dog			♠		
Figure of Eights			♠		
Approach and Landing			♠		
The Circuit			♠		
Low Flying		♠			
Precautionary and Forces Landings		♠			
Pilot Navigation	♠				
Emergency Procedures		♠			

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Solo Practice

4.11 LESSON PLAN NO. 8 (SOLO PRACTICE)

This lesson is a solo flight which permits the student to practice turning flight in the hover, and circuits, on his or her own time and speed.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Walking the Dog					♠
Figure of Eights					♠
Approach and Landing					♠
The Circuit					♠

- | | |
|---------------------------|--|
| 2. Post-flight debriefing | <ul style="list-style-type: none"> • Question the student and clarify any problems which may have arisen • Assign study material for next lesson |
| 3. Preview of next lesson | <ul style="list-style-type: none"> • Pilot Navigation • Emergency Procedures |

4.12 LESSON PLAN NO. 9

This lesson introduces pilot navigation to the student

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Approach and Landing			♠		
The Circuit			♠		
Low Flying			♠		
Precautionary and Forces Landings			♠		
Pilot Navigation		♠			
Night Flying					
Multirotor Type Conversion	♠				
Emergency Procedures		♠			

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Solo Practice

4.13 LESSON PLAN NO. 10 (SOLO PRACTICE)

This lesson is a solo flight, which permits the student to practice forward flight, including navigation, on his or her own time.

1.0 Pre-flight briefing	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.					
The Circuit					♠
Approach and Landing					♠
Low Flying					♠
Precautionary and Forces Landings					♠
Pilot Navigation					♠

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Multirotor Type Conversion

4.14 LESSON PLAN NO. 11

This lesson is dedicated to flight operations using a new air vehicle. Although the skills associated with a new aircraft will be different and need to be learned, this lesson plan will stress the airmanship associated with flying within the pilots capabilities and taking on the responsibility of learning the new subsystems without the benefit of an instructor to teach each specific new system function.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Multicopter Type Conversion		♠			
Emergency Procedures		♠			

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Night Flying

4.15 LESSON PLAN NO. 12

This lesson involves teaching the student the differences between day and night flying. Consideration should be given to starting this lesson plan at dusk prior to last light.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Night Flying		♠			
Emergency Procedures		♠			

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - Night Flying Supervised Practice

4.16 LESSON PLAN NO. 13

This lesson is a continuation of the night flying exercises demonstrated and practiced during the previous lesson plan.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Night Flying			♠		
Emergency Procedures			♠		

2. Post-flight debriefing
 - Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson
3. Preview of next lesson
 - General Review

4.17 LESSON PLAN NO. 14

This lesson plan consists of a review of all the essential building blocks for safe and efficient RPAS flight in a commercial environment. Successful completion of this lessons will give the student the knowledge and skills require to complete an InDro unit checkout.

1.0 Pre-flight briefing Clarify with the student: — “What we are going to do. How we are going to do it. Safety considerations”.	FAMILIARIZATION DEMONSTRATION	DEMONSTRATION & PRACTICE	SUPERVISED PRACTICE	REVIEW	SOLO PRACTICE
Translating Flight				♠	
Hovering Turns				♠	
Circular Flight about Pilot				♠	
Figure of Eights				♠	
The Circuit				♠	
Approach and Landing				♠	
Low Flying				♠	
Precautionary and Forces Landings				♠	
Pilot Navigation				♠	
Multirotor Type Conversion				♠	
Emergency Procedures				♠	

2. Post-flight debriefing
- Question the student and clarify any problems which may have arisen
 - Assign study material for next lesson/flight test if necessary.

4.18 SCORING STUDENT PERFORMANCE

This subsection was informed by TP 13723 - Flight Test Guide - Private Pilot Licence – Aeroplane, Ref. C.

4.18.1 Errors

Error: means an action or inaction by the flight crew that leads to a variance from operational or flight crew intentions or expectations.

Minor Error

A minor error is an action or inaction that is inconsequential to the completion of a task, procedure or manoeuvre, even if certain elements of the performance vary from the recommended best practices.

Major Error

A major error is an action or inaction that can lead to an undesired aircraft state or a reduced safety margin, if improperly managed; or an error that does not lead to a safety risk, but detracts measurably from the successful achievement of the defined aim of a sequence/item:

Critical Error

A critical error is an action, inaction that is mismanaged and consequently leads to an undesired aircraft state or compromises safety such as:

Non-compliance with Canadian Aviation Regulations (CARs) or non-adherence to mandated standard operating procedures;

Repeated improper error management or uncorrected and unrecognized threats that risk putting the aircraft in an undesired state; or

Repeated major errors or the non-performance of elements prescribed in the Performance Criteria* that are essential to achieving the Aim* of a test sequence/item.

4.18.2 Deviations

Deviation: means a variance in precision with respect to a specified limit published for a test sequence/item, as a result of pilot error or faulty handling of the aircraft.

Minor Deviation

A minor deviation is a deviation that does not exceed a specified limit:

Major Deviation

A major deviation is a deviation that exceeds a specified limit or repeated minor deviations without achieving stability:

Critical Deviation

A critical deviation is a major deviation that is repeated, excessive or not corrected, such as:

Repeated non-adherence to specified limits;

Not identifying and correcting major deviations; or

More than doubling the specified value of a limit.

4.18.3 Four-Point Marking Scale

When applying the 4-point scale, award the mark that best describes the weakest element(s) applicable to the candidate's performance of the particular test sequence/item demonstrated.

Mark of Four (4)

Performance is well executed considering existing conditions:

Aircraft handling is smooth and positive with a high level of precision.

Technical skills indicate a thorough knowledge of procedures, aircraft systems, limitations and performance characteristics.

Situational awareness is indicated by continuous anticipation and vigilance.

Flight management skills are exemplary and threats are consistently anticipated, recognized and well managed.

Safety margins are maintained through consistent and effective management of aircraft systems and mandated operational protocols.

Mark of Three (3)

Performance is observed to include minor errors:

Aircraft handling with appropriate control input includes minor deviations.

Technical skills indicate an adequate knowledge of procedures, aircraft systems, limitations and performance characteristics to successfully complete the task.

Situational awareness is adequately maintained as candidate responds in a timely manner to cues and changes in the flight environment to maintain safety while achieving the aim of the sequence/item.

Flight management skills are effective. Threats are anticipated and errors are recognized and recovered.

Safety margins are maintained through effective use of aircraft systems and mandated operational protocols.

Mark of Two (2)

Performance is observed to include major errors:

Aircraft handling is performed with major deviations and/or an occasional lack of stability, over/under control or abrupt control input.

Technical skills reveal deficiencies either in depth of knowledge or comprehension of procedures, aircraft systems, limitations and performance characteristics that do not prevent the successful completion of the task.

Situational awareness appears compromised as cues are missed or attended too late or the candidate takes more time than ideal to incorporate cues or changes into the operational plan.

Flight management skills are not consistent. Instrument displays, aircraft warnings or automation serve to avert an undesired aircraft state by prompting or remedying threats and errors that are noticed late.

Safety margins are not compromised, but poorly managed.

Mark of One (1)

Performance is observed to include critical errors or the Aim (objective) of the test sequence/item is not achieved:

Aircraft handling is performed with critical deviations and/or a lack of stability, rough use of controls or control of the aircraft is lost or in doubt.

Technical skills reveal unacceptable levels of depth of knowledge or comprehension of procedures, aircraft systems, limitations and performance characteristics that prevent a successful completion of the task.

Lapses in situational awareness occur due to a lack of appropriate scanning to maintain an accurate mental model of the situation or there is an inability to integrate the information available to develop and maintain an accurate mental model.

Flight management skills are ineffective, indecisive or noncompliant with mandated published procedures and/or corrective countermeasures are not effective or applied.

Safety margins are compromised or clearly reduced.

5 CONCLUDING MATERIAL

5.1 GENERAL

This training manual was prepared in accordance with the Training Manual document outline contained within the original instruction for document production issued by TC and the subsequent regulations promulgated within CARs Part IX. It has been prepared to describe the ground and flight training program currently used at InDro and which would be used under the Advanced Operator designation.

The specific elements of the training programs (e.g. PowerPoint slides and performance records) are held by the Chief Pilot along with the actual information on each student in accordance with appropriate confidentiality requirements.

ANNEX A – INDRO TRAINING RECORDS SUMMARY



COUNTY OF RENFREW EMERGENCY SERVICES RPAS PROGRAM

RPAS TRAINING RECORD SUMMARY

PILOT: _____ LICENSE NO: _____

	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
FLIGHT TRAINING																
GROUND TRAINING SECTION 1-9																
INDOCTRINATION X 1-15																
FORCED LANDINGS																
NAVIGATION																
NIGHT FLIGHT																
MULTI-ROTOR CONVERSION																
EMERGENCY PROCEDURES																
VLOS / BVLOS TRANSIT																
BVLOS SEARCH																
BVLOS CONFINED LANDING																
BVLOS FLIGHT TECHNIQUES																
BVLOS NIGHT FLIGHT																
ADVERTISED EVENTS																
>400FT AGL																
CONTROLLED AIRSPACE OPERATIONS																

